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Dactylorhiza umbrosa (Kar. & Kir.) Nevski (Orchidaceae): an addition to flora of India from Kashmir Himalaya

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As originally published, Figure 3 incorporated an overview map of India that does not include the fullest extent of territorial claims made by India. Thus, areas claimed by India within the state of Jammu and Kashmir but either controlled by Pakistan or claimed by China, were not shown. Figure 3, revised here, shows the state of Jammu and Kashmir at its fullest extent as recognized by India.

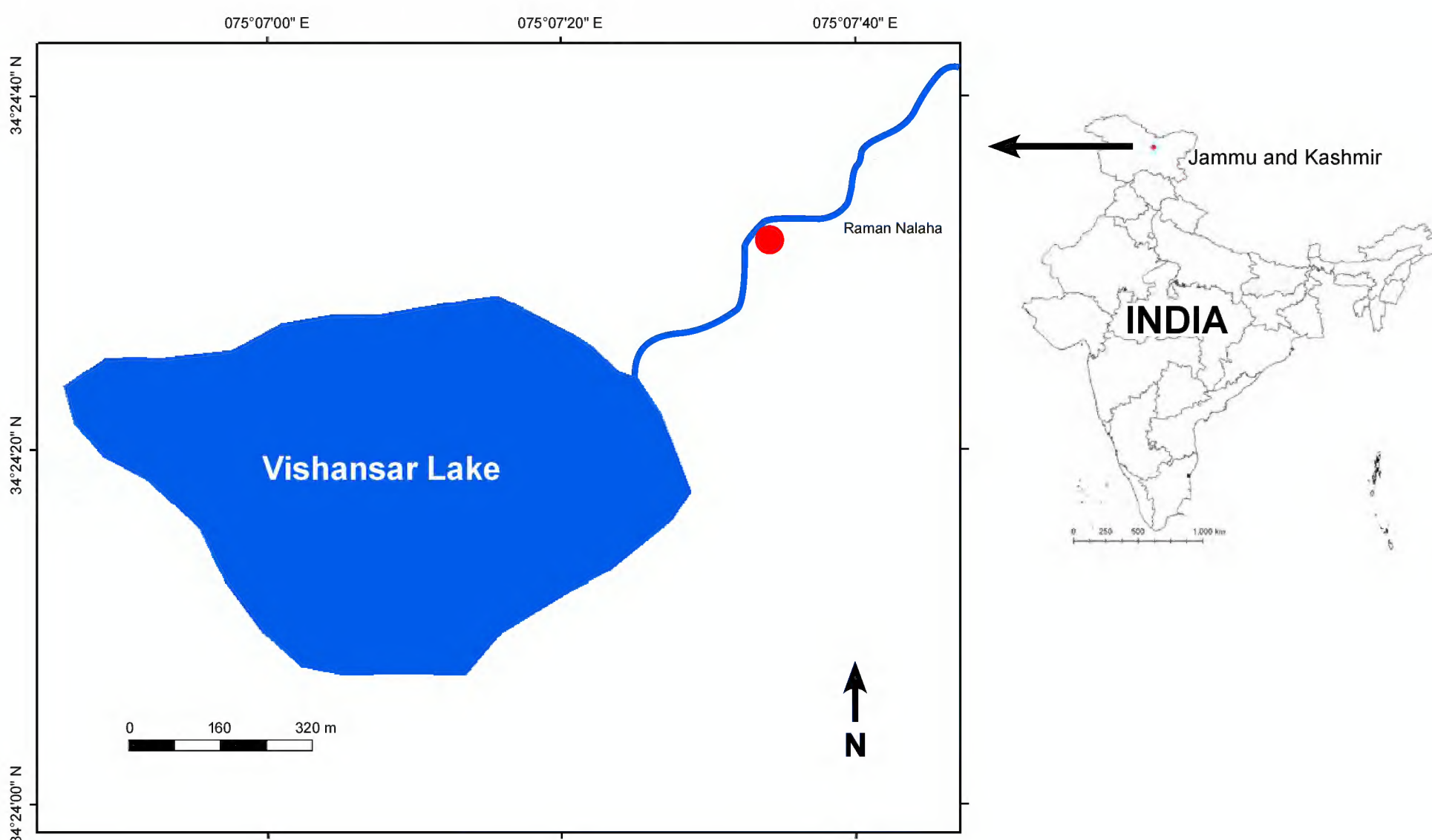


Figure 3. New record of *Dactylorhiza umbrosa* (red dot), Vishansar-Sonamarg (Raman Nalaha) (Ganderbal district), 34°24'34" N, 075° 07'31" E, Kashmir Himalaya, Jammu and Kashmir, India.

The publication, as previously published, begins on the next page.



Dactylorhiza umbrosa (Kar. & Kir.) Nevski (Orchidaceae): an addition to flora of India from Kashmir Himalaya

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Abstract: *Dactylorhiza umbrosa* (Kar. & Kir.) Nevski is reported for the first time from Kashmir Himalaya, India. A brief description, illustration, photographs of diagnostic features, and a distribution map is provided. Also provided are comparative characters to distinguish *D. umbrosa* from other species already known from Kashmir Himalaya: *D. hatagirea*, *D. kafiriana* and *D. viridis*. The species shows rare distribution in the alpine habitats of this Himalayan region and overexploitation for local use poses threat to the existence of this rare medicinal orchid species. Therefore, the documentation of this species assumes significance for devising conservation strategies and sustainable use in this Himalayan region.

Keywords: new record; taxonomy; rare distribution; conservation; sustainable use

Globally, the genus *Dactylorhiza* (Orchidaceae) is represented by ca. 75 species that are mainly distributed in the Northern Hemisphere (Pilon et al. 2006; Chuhan et al. 2014). Species of this genus occupy a wide range of open habitats from dune slacks to alpine meadows and including swamps and peat bogs (Pilon et al. 2006). *Dactylorhiza* differs from all other genera in Orchidaceae by its finger-like tuberosities and the name is derived from the Greek words *daktylos* (finger) and *rhiza* (root) (Renz and Taubenheim 1984).

Dactylorhiza is one of the taxonomically challenging genera, as demonstrated by the varying number of species worldwide (12–75) recognized by different authors (Bournérias et al. 1998; Pedersen 1998; Hedreñ 2001). This taxonomic complexity is largely attributed to frequent interspecific hybridization with nearly all hybrid combinations possible (Averyanov 1990). In India, the genus is represented by three species: *D. hatagirea* (D. Don) Soo, *D. kafiriana* Renz and *D. viridis*

(L.) R. M. Bateman, Pridgeon & M.W. Chase. These three species are mainly distributed in the Western Himalayas (Deva and Naithani 1986; Misra 2007; Adhikari et al. 2013).

During recent times, while carrying out floristic surveys in the alpine of Kashmir Himalaya, flowering specimens of an unknown orchid species were collected. After critical examination of its diagnostic characters, the specimens were identified as *Dactylorhiza umbrosa* (Kar. & Kir.) Nevski, a species hitherto unreported from the region. On screening the relevant taxonomic literature (Duthie 1906; King and Panting 1979; Deva and Naithani 1986), it was found that *D. umbrosa* was not known from anywhere in India. Therefore, this new record of *D. umbrosa* from Kashmir Himalaya also represents the first record of this species from India.

The Kashmir Himalaya is located in the northwestern part of the Indian subcontinent between 33°22' N and 34°50' N latitude and 073°55' E and 075°33' E longitude, covering an area of ca. 16,000 km². During this study, standard herbarium methods were followed (Bridson and Forman 1992; Ganie et al. 2015). The voucher specimens were deposited at the University of Kashmir Herbarium (KASH). The micro-characters of the species were studied and photographed with the help of a trinocular stereo zoom microscope (Model: Carl Zeiss Discovery V8).

Dactylorhiza umbrosa (Kar. & Kir.) Nevski, Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 4: 332. 1937.

Basionym: *Orchis umbrosa* Kar. & Kir., Bull. Soc. Imp. Naturalistes Moscou 15: 504. 1842.

Vernacular name: Gulaib Nar-ma-da (Kashmiri)

Plants herbaceous, up to 40 cm tall; tubers white-creamish in colour, 3–5 palmately-lobed; stem erect, stout, fistular, with 2–3 tubular sheaths at base; leaves 4–8, often clustered at base of stem or sometimes

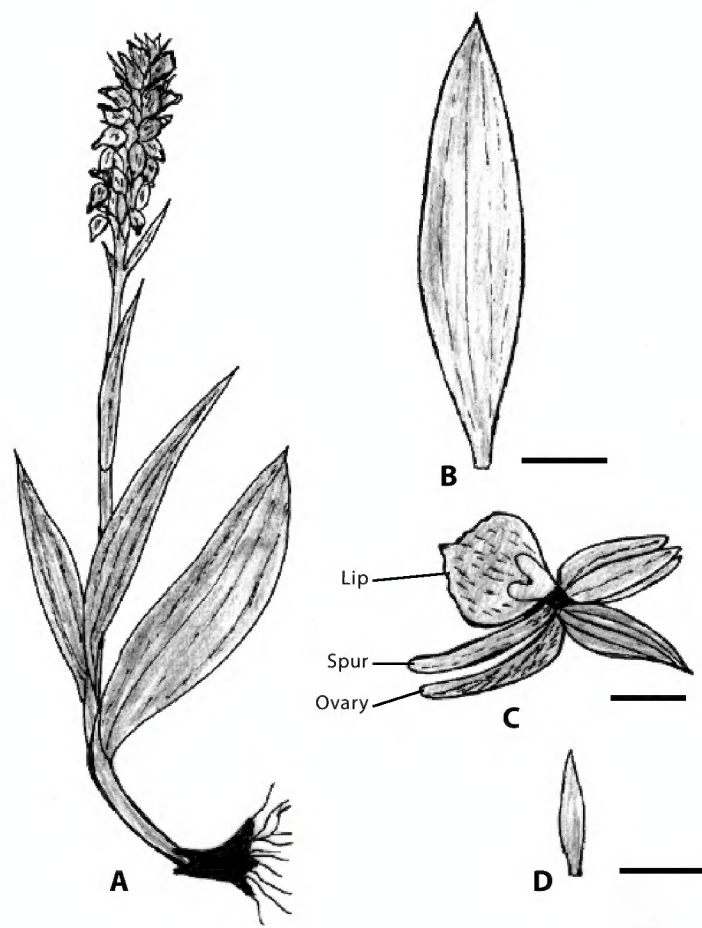


Figure 1. *Dactylorhiza umbrosa*. **A:** Habit [scale = 0.5 cm]. **B:** Leaf [scale = 1 cm]. **C:** Flower [scale = 2.5 cm]. **D:** Floral bract [scale = 1 cm].

widely spaced, green, spotless, lanceolate to oblong-lanceolate, 7–11 × 1–3 cm, apex acuminate, basal leaves oblong or ovate; rachis 5–15 cm, multi-flowered; floral bracts green, sometimes tinged with purplish red, narrowly lanceolate, basal ones exceeding ovary, apex acuminate; flowers purplish-lilac, medium sized; ovary and pedicel 12–15 mm; dorsal sepal erect, oblong, concave, 10 mm long, 3-veined, apex obtuse; lateral sepals spreading, obliquely oblong, lanceolate, slightly larger than the dorsal one; petals erect, forming a hood with dorsal sepal, narrowly oblong, oblique, 9 mm long, 2-veined, apex sub-obtuse; lip obovate to obcordate, 10 mm long, base spurred, margin entire to shallowly 3-lobed, apex or mid-lobe obtuse rounded, disk densely minutely papillose, purplish rose to pale purple with a heart-shaped patch composed of dark purple lines and dots; spur pendulous, slightly curved forward, cylindric, 12–15 mm, almost as long as ovary, apex obtuse (Figures 1 and 2).

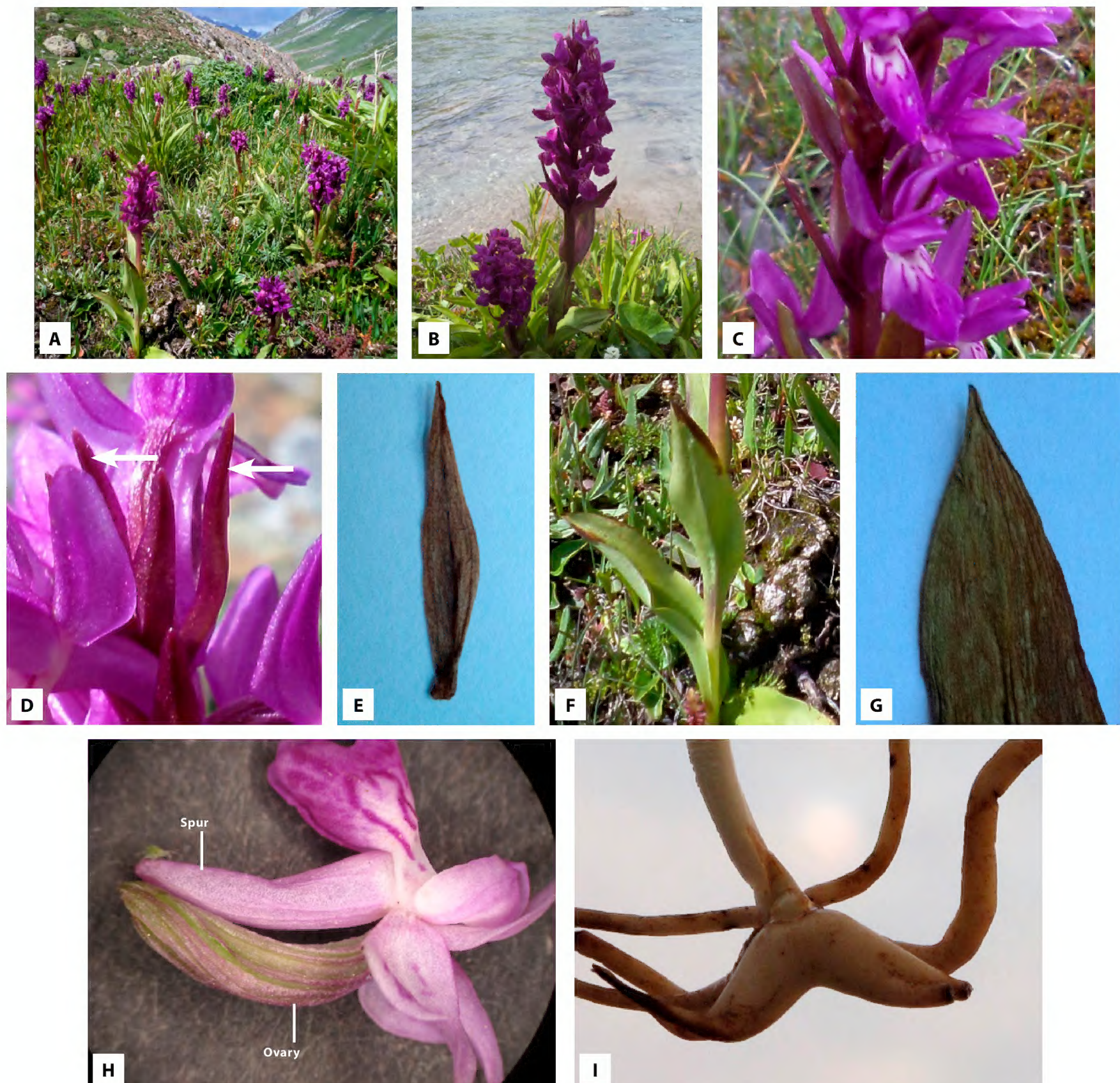


Figure 2. **A:** Population of *Dactylorhiza umbrosa*. **B:** An individual plant. **C:** Flowers. **D and E:** Floral bracts. **F:** Leaves arranged in lower part of stem. **G:** Leaf apex. **H:** Position of spur and ovary. **I:** Tuber.

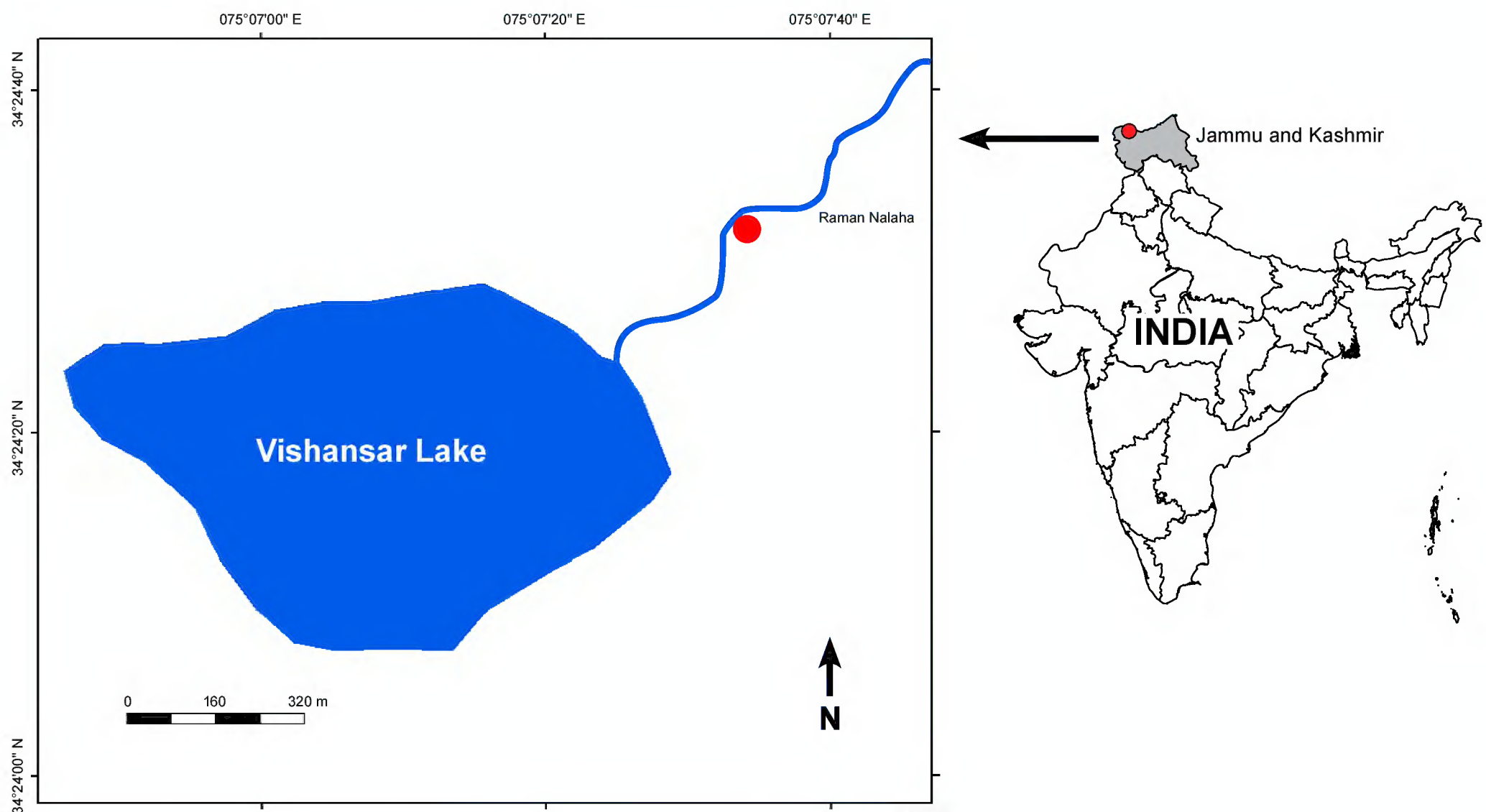


Figure 3. New record of *Dactylorhiza umbrosa* (red dot), Vishansar-Sonamarg (Raman Nalaha) (Ganderbal district), 34°24'34" N, 075° 07'31" E, Kashmir Himalaya, Jammu and Kashmir, India.

Flowering period: June to July.

Global distribution: China (North Xinjiang), Afghanistan, Kazakhstan, Pakistan, Russia (southwest Siberia), Turkmenistan, Uzbekistan; southwest Asia, and now reported from India (Kashmir Himalaya).

Local distribution: *Dactylorhiza umbrosa* is here recorded twice from one site only in Kashmir Himalaya.

Specimens examined (new records): India: Jammu and Kashmir: Kashmir Himalaya: Vishansar-Sonamarg (Raman Nalaha) (Ganderbal district), 34°24'34" N, 075° 07'31" E, 3,645 m above sea level (Figure 3): 20 July 2012, Shapoo, Kaloo, Aijaz and Khuroo, 7771; and 20 July 2012, *ibid.*, 7772. Both the specimens deposited in the University of Kashmir Herbarium (KASH).

Until very recently, three species of genus *Dactylorhiza*, namely *D. hatagirea*, *D. kafiriana*, and *D. viridis*, have been reported from Kashmir (Deva and Naithani 1986; Misra 2007; Adhikari et al. 2013). These species are differentiated on the basis of leaf, lip and spur characters (Deva and Naithani 1986). This study revealed that the leaves of the *D. umbrosa* are lanceolate to oblong-lanceolate, arranged in lower part of the stem, and sometimes more or less basal, that the lip is usually as long as broad, flat, orbicular or reniform-rhomboidal, tapering towards apex, and that the spur is pendulous, slightly curved towards the apex. Based on these morphological characters, the taxonomic delimitation of *D. umbrosa* from other species of the genus occurring in Kashmir Himalaya is shown in Table 1.

In this study, *Dactylorhiza umbrosa* was collected from only one site, which indicates its rarity in Kashmir Himalaya. This species has been used as aphrodisiac and tonic, and thus, local overexploitation poses a threat to the survival of this species. Therefore, documentation of this species is an important step towards devising a conservation strategy and a sustainable management plan of this rare medicinal orchid.

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Table 1. Comparison of diagnostic characters between different *Dactylorhiza* species occurring in the Kashmir, Himalaya, India

Diagnostic characters	<i>D. hatagirea</i>	<i>D. umbrosa</i>	<i>D. viridis</i>	<i>D. kafiriana</i>
Leaf shape	Oblong-linear lanceolate	Lanceolate-linear lanceolate	Narrowly obovate-oblong or elliptic-lanceolate	Lanceolate or linear
Leaf apex	Obtuse to acuminate	Acuminate	Obtuse or acute	Acuminate
Floral bract shape	Lanceolate	Narrowly lanceolate	Linear to narrowly lanceolate	Narrowly lanceolate
Floral bract colour	Green	Green, sometimes tinged with purplish red	Brownish green	Reddish brown
Flower colour	Lilac to purplish rose	Purplish rose	Greenish yellow to greenish brown	Purplish-lilac or rose
Lip shape	Ovate to sub-orbicular	Obovate to obcordate	Deflexed, oblong-lanceolate	Oblong or rhomboidal
Lip apex	Slightly 3-lobed, mid-lobe triangular	Entire to shallowly 3-lobed, side lobes roundish, mid-lobe smaller, triangular	Tridentate, mid-tooth smaller	Slightly 3-lobed, mid-lobe elongated
Shape of lip spots	Spoon-shaped	Heart-shaped	Spots absent, but a central longitudinal keel present	Dome-shaped
Spur	Cylindrical or conic, more or less straight, equaling the ovary or slightly shorter	Cylindrical, slightly curved towards apex, almost as long as ovary	Saccate-ovoid, straight, shorter than ovary	Saccate-conical, straight, shorter than ovary

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